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Greater St. Louis Citizens' COMMITTEE FOR NUCLEAR INFORMATION

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NUCLEAR WAR IN ST. LOUIS: ONE YEAR LATER

A STORY BASED UPON THE FACTS FROM THE CONGRESSIONAL HEARING

CAMP G – 2-27, OCTOBER 16, 196-. Tomorrow it will be just one year since That Day -- the day that ended the world we used to live in, and reduced our lives to an elemental struggle against hunger, sickness, grief, and despair. Here in this camp outside Vermillion, 17,000 of us who managed to pull through, more or less, are living in huts, tents, and sod houses. Among the St. Louisans here, by some ironical chance, are three of us who were active in CNI. Yesterday we decided to mark this grim anniversary by writing down the history of this terrible year, as we know it. Not that anyone will publish this mock *Nuclear Information* -- not much is printed nowadays, and a sheet of clean white paper is a rare luxury. But we have managed to get hold of some scraps of packing material to write on. Maybe at some remote time, when something like civilization is restored, if it ever is, historians would like to know what we have seen.

I. THE DESTRUCTION OF ST. LOUIS

My name is George Scott. I'm a physicist -- or at least, I was. My being alive today is just chance. I was preparing a paper that had to be finished on That Day, so I stayed home to work on it in the little study I had built for myself in the basement of my new house out beyond Creve Coeur. On the campus, hardly anybody survived.

It has been pretty hard to separate sound information from the rumors that fill the air, but it's now generally agreed that the continental U.S. was hit by nearly 1500 megatons on the one day that the war lasted.[1] Seventy cities were hit, as well as major defense installations and atomic facilities.[2] About 23 million people were killed that first day.[3] More than that have died since, but nobody agrees about the exact figure.

I remember that when the Holifield Committee held hearings on the subject, back in 1959 I think, one expert estimated that a massive attack would injure about 43 million people, of whom more than a third would survive.[3] That's not the way it was, though, the injured didn't have much chance, with the hospitals gone and medical supplies burned up and the doctors mostly dead. As for the uninjured -- well, there was starvation, and there was typhus, and then there were a lot of people who just went out of their minds and either killed themselves or died because they couldn't make the effort to survive.

Two Weapons

St. Louis was hit by two weapons, of eight and ten megatons equivalance.[2] The ten megaton bomb exploded at 11 th and Pine.[4] They say there's a crater there now, a mile across and several hundred feet deep. The force of the blast, and it's heat, destroyed nearly everything in a circle extending north and south to the city limits, and westward as far as Big Bend. East of Grand almost everybody was wiped out at once. From Grand to Big Bend some people survived the attack itself, but not many are still alive.[5]

The ferocious heat of the explosion caused the worst havoc. Fires were started instantaneously as far away as Weldon Spring.[6] People who were out in the open suffered third degree burns even in Ellisville.[7] Second degree burns were common several miles beyond that. And many people were burned by fires started by the explosion.

The destruction of major firehouses, and the panic

Continued on next page.

• • • AN EXPLANATION • • •

The probable effects of nuclear war in the United States were described last June in hearings before the Holifield subcommittee on radiation of the Joint Congressional Committee on Atomic Energy. The assumption was that the 70 largest cities in the country had been destroyed by nuclear weapons. Technical experts discussed the effects of such an attack. Physicists estimated the levels of radiation and the destruction of buildings. Weather experts told how fallout would be distributed from the bomb explosions. Physicians described the effects of blast, heat and radiation on humans. Agricultural scientists discussed the damage to livestock and crops and so on.

The evidence was presented, but nobody put it together to try to answer the fundamental question: **What would life be like for the survivors of a nuclear war?**

This issue of *Nuclear Information* is an answer to that question in the form of fiction -- but it is not to be regarded as a work of imagination. The principal facts in this account are taken from the testimony. The footnotes give the specific sources.

In publishing its report, the Holifield subcommittee stated that it "believes that the fundamental issues dealt with in these hearings are extremely serious, and that they are issues which need to be understood, considered and discussed." CNI offers this interpretation in the hope that it will help accomplish this aim.

In this account some assumptions have been made. It has been assumed that the Army is able to take control of the situation; since many military bases are outside of urban areas, this assumption seems reasonable. A technical assumption is that in St. Louis County the water system continues to function; the location of the Howard Bend plant makes this possible. A third assumption is that the survivors retain the ability and willingness to cope with their desperate situation. If these assumptions should be overly-optimistic, the aftermath of a nuclear war might be far more grim than the story presented here.

This account of three St. Louisans a year after the day of devastation was written by Dr. Florence Moog, professor of zoology in Washington University, with the technical assistance of Dr. Walter C. Bauer, instructor in surgical pathology, School of Medicine, and Dr. J. B. Reynolds, assistant professor of physics, Washington University. CNI hopes that their story will help its readers to better understand the meaning of the facts that were presented before the Holifield committee.

following the explosion, made fire control impossible. The many small blazes ignited by the explosion joined to form bigger blazes, and these finally flowed together to become one huge "fire-storm" that enveloped most of the city and raged for hours.[8] Terrific winds travelled radially inward toward the center of the conflagration, from all directions. An enormous column of smoke rose rapidly over the burning area. The loss of oxygen and the outpouring of acrid fumes in the region of the fire seems to have accounted for the deaths of many who might otherwise have been able to reach safety.

The forests and fields caught fire too.[9] The wind out of the west of northwest swept these fires along, denuding vast areas of Illinois and southern Missouri. Throughout the entire country forest fires raged for weeks. The eastern Ozarks burned for two weeks, until heavy rains put out the blaze.

Ironically enough, radiation caused little harm immediately -- first the heat and fire and fly[illegible], debris got in their deadly blows. But the fallout came soon enough. It is now calculated that an amount of fission products equivalent to a 9 megaton all-fission explosion was produced by the two weapons used on St. Louis.[10] Of this staggering amount, about seven megatons of energy equivalent came down as local fallout; the other two megatons have been dispersed in the stratosphere and will come down as world-wide fallout.[11] The local fallout was distributed downwind over an elongated area about 80 miles wide at the widest point, and about 200 miles long -- approximately 9000 square miles altogether, stretching across southern Illinois towards Evansville, Indiana.[12]

Fallout Casualties

Casualties from local fallout were heaviest around East St. Louis. In Belleville, persons in the open or in inadequate shelters received radiation doses of over 1000 rads during the second hour after the attack. During the first 24 hours after the attack the total radiation to such persons was about 5000 rads.[13] Since only 1000 rads of radiation, received in one dose will kill all the people exposed to it, those who received 5000 rads didn't live through the second day. Although many people stayed indoors in an attempt to avoid the fallout hazard, some were in buildings that reduced the radiation dose to one-tenth,[14] so that 500 rads were absorbed within a day. All who received as much as 1000 rads within a few hours were dead by the end of the week.[15] For those who received 500 rads in a short interval, mortality was about 90 per cent; mostly they were dead by the middle of November.[16]

In the whole 9000 square mile area of appreciable local fallout people who couldn't or didn't find shelter received doses up to 500 rads the second day after the attack, 250 the third day, 150 the fourth day, and 100 on the fifth day.[17] They didn't live much longer than that.

The region of local fallout is still radioactive.[18] The persistence of high radioactivity was one of the factors that led to the decision, later in December, to evacuate most of the area. Another factor was the probability that no crops could be raised on the heavily contaminated soil for a long time, and then there was also the fear that the denuded land, with its water-holding cover gone, would be subject to severe flooding in the spring.[9]

It turns out that the decision was well taken. We hear that over hundreds of square miles of southern Illinois there is still nothing to be seen but the scarred, eroded earth -- nothing was planted, and nothing has sprouted. West of St. Louis conditions are said to be somewhat better, but the ground is so badly contaminated that there is no possibility of using food grown on it. The worst of it is that the peak of accumulation of the long-lived isotopes is still in the future. In about two years we expect that the strontium 90 concentration in the local fallout region will range from 10,000 to 300,000 millicuries per square mile, and cesium 137 from 20,000 to 600,000.[17]

On a worldwide scale, the explosion of 4,000 megatons of weapons released 2000 megatons of energy equivalent of fission products. This means that a total of 200 million curies of strontium 90 was produced.[19] (Remember that a "curie" is a thousand millicuries.) Four-fifths of this came down as local fallout, but the remaining 40 million curies will come down gradually from the stratosphere. In two to five years, when the strontium 90 concentration will be greatest, the average strontium 90 concentration in the north temperate zone will be about 1400 millicuries per square mile.[20] Back in the late fifties we were concerned because the soil around St. Louis had 46 millicuries per square mile because of fallout from testing![21] And yet it is expected that 10 to 20 per cent of the area of the United States will have concentrations up to 500 times greater than the north temperate zone average of 1400 millicuries per square mile.[17] Right now it doesn't seem possible that food crops could be grown in such areas for a century at least.[22]

II. A DOCTOR'S REPORT

I'm Bill Rosenthal, M.D., practitioner of one of the few professions that still flourish in this new era. Sickness and suffering are among the few things we have no shortage of these days. Not that a doctor's life is a very satisfactory one. It's maddening to think of what we could have done, this past year, with doctors and nurses and technicians and hospital beds and antibiotics and drugs. Not to mention food. Well, we did what we could.

I was at County Hospital when the moment came. County and St. Vincent's were the only hospitals in the entire St. Louis area that remained in action. All other hospitals including our two great medical centers were in the zone of total destruction. St. Joseph's in Kirkwood stood up, but was heavily damaged in the fire that raged through the area. I don't remember when the first casualties began to arrive -- we were too busy moving patients dowstairs and trying to cover the broken windows. We were handicapped by lack of light. There was an auxiliary power supply, of course, but we hesitated to draw on it because we suspected, right away, that Union Electric wasn't likely to operate again in our time.[5]

The first victims to arrive were some youngsters from Clayton High School. Caught out of doors, they had sustained terrible burns.[7,23] Three of them who had been standing near a wall had been hit by the "bouncing back" of the pressure wave from the wall; they were already bleeding from the lungs.[24] In a few minutes more, people were pouring in -- more burns, injuries from flying glass and falling masonry, even broken heads and limbs from the powerful wind that had picked people up and smashed them against walls and trees.[24]

Supplies Give Out

We worked feverishly, but it was like trying to bail out a lake with a teacup. Our supplies gave out in a matter of hours.[25] The phones were dead, but from what we could learn from those victims who were able to talk coherently,

we knew that we could expect no help from outside. By evening we couldn't even get any more people indoors, where they would have had some protection from the lethal fallout. In the St. Louis area, more than half a million people died that first day.[26]

The next two days were more horrible than anything any novelist has ever imagined. Our supplies of opiates exhausted, we could do nothing to quiet the screams of the burned and mangled patients who lay all around us.[25] We didn't even have dressings to cover their torn and seared flesh.[25] The piles of bodies rose higher -- for a while it seemed that we should all be buried under the heaps of dead.

On the fourth day a detail of soldiers arrived, equipped with special suits to protect them from fallout. Somehow they managed to dispose of the corpses. A little later the state police brought us two truckloads of canned food, though we were not to see anything like bread or fresh milk for months. Actually demands on our food stores were not very heavy, because so many of our patients were unable to eat. We had little chance of feeding them intravenously.

Radiation Sickness

Cases of radiation sickness were streaming in by the second day. We saw very few victims of massive exposure -- 5000 rads or more -- because they didn't live long enough to be brought in. Very quickly however we were getting people who had been exposed to 1000-5000 rads. Such people suffered severe gastrointestinal damage. After a day or so, their nausea, vomiting, and fever subsided, but then returned with greater intensity, and death followed within about a week.[27] Together with the victims of burns, whom we were just unable to deal with, the victims of radiation sickness made up the greater part of the more than 400,000 in the greater St. Louis area who survived the attack but succumbed not long afterwards.[26]

In another day or so we were seeing the largest group of people hurt by radiation, people who had absorbed 200-1000 rads. Such patients showed serious gastrointestinal disorders at first, but recovered in a day or so. Then the further signs of radiation injury appeared -- falling out of hair, easy bruising or bleeding from the skin and gums, and a return of fever and weakness during the third week after the attack. At this time the number of white corpuscles and of the small platelets that are essential for blood clotting reached their lowest levels and remained low for days or weeks.

Our worst problem with these patients was their lack of resistance to infections. Often they succumbed to microorganisms that rarely cause disease in healthy people. With heavy antibiotic treatment and repeated blood transfusions over a period of months we might have saved many in this group. As it was, more than half of those exposed to 500 rads died within two months after exposure.

Milder Cases

Of the people exposed to less than 200 rads, half also experienced nausea and vomiting, but to a mild degree in most cases. These and others without any severe symptoms showed a definite lowering of the number of white corpuscles in the blood, beginning in the third week. Most of these recovered, or if they died, it was from causes not directly connected with their radiation exposure.[27]

After about three weeks, the staggering death rate began to decline. But even for the 200,000 who survived without apparent injury life was very difficult. Here in our refugee center in South Dakota almost everyone is suffering to some extent from malnutrition and exposure to weather. All sorts of infectious diseases are rampant. Antibiotics are still very difficult to obtain. Last spring the camp here was decimated by pneumonia. Blindness is terribly common.[23] And soon we expect leukemia and bone cancer to appear among those who lived through fairly heavy radiation doses.[28] On the basis of the Hiroshima experience, we think that leukemia cases will show up by the end of the next year, and reach a peak in 5 to 8 years.

III. A HOUSEWIFE IN THE POST-WAR WORLD

My name is Marian Swingle. I call myself a housewife, though the term is hardly apt. My husband is dead, and I never expect to have a house of my own again. Yet I'm one of the lucky ones. I'm in good mental and physical health, and I still have two of my three children. Not many mothers are so well off.

When the bombs exploded, I was down in the basement, washing. For a moment I thought the washing machine had blown up, but the continued racket soon made it clear that something terrible had happened outside. I grabbed Davey and rushed upstairs -- though we were in Ballwin, 18 miles from 11th and Pine, our windows were smashed and a piece of the roof was torn away. When I looked to the east, I saw that awful cloud rising over the city.

Fortunately I had the sense to go back to the basement and stay there. Many women rushed outdoors and headed for the school -- there wouldn't have been so much radiation sickness if they had stayed indoors. It was hard to stay in, not knowing what had happened to Johnny and Edith, but I figured it was best to trust the school authorities. I know that when the kids did get home, they would have only me to depend on, because when I saw that cloud over the city, I felt instinctively that John would not come back. His office was on North 8th Street.[5]

Children Brought Home

The children were brought home on a bus the next night. After a couple of days I took in the two Blanchard boys from next door. Their mother was one of those who had rushed out that first day. She died at home, about 10 days later. A neighbor got her to County Hospital, but brought her back again; they just weren't taking any more patients.[25]

Seven of us -- including a neighbor, Helen Stein, who had lost her husband and daughter -- lived in the basement until February. It wasn't too bad at first. The water fortunately held out.[29] We had some canned goods, and some of the food in the freezer was usable for five or six days. We couldn't cook, of course, with both gas and electricity gone, though we made little fires with waste lumber that John had stored in the basement. During the winter we chopped up the furniture and burned that. At least we had our good bedding -- I wish I still had it.

After almost a week, Helen ventured out to the local supermarket. Though damaged, it was still standing, and in the hands of the military. They gave her a package of powdered milk, some canned tomatoes, and two bags of dried beans. We didn't at that point appreciate the packaged stuff, but a little later all the familiar bags and boxes – sugar, salt, flour, rice, etc. – disappeared. It seems that in the warehouses closer to

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CNI collects and studies technical information on – the effects of nuclear testing, and the military and peaceful uses of nuclear energy. Through *Nuclear Information,* a speakers bureau, technical bulletins and public meetings, CNI makes these facts available to the public in forms that the citizen can understand. CNI also sponsors the Baby Tooth Survey, a 10-year scientific program to collect baby teeth and study the amount of fallout strontium 90 present in the teeth.

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the city most of the soft packages had burst and their contents had been badly contaminated by fallout.

Some cans had come apart at the seams too, but on the whole the canned stuff came through rather well.[30] Our diet got to be pretty peculiar, but we got along. It was the babies who were worst affected, since milk became all but unobtainable. Occasionally people did manage to get milk from places where a few dairy cows had survived, but the consequences were sometimes disastrous. I heard that for a time milk in the local area contained so much radioiodine that a pint would destroy a baby's thyroid gland.[28]

Food Supplies Give Out

It was in late November that things became terribly bad. The local food supplies were exhausted by then. The year's crops had been mostly harvested before That Day, and a good deal of the food was still suitable for human consumption. But the trouble was in transportation. The railroads had been knocked out althogether, and all the highways were interrupted by tortuous detours. Many a time we walked to the old supermarket, only to find nothing in stock. Our shoes went through before long, and there was no getting them fixed. Our car had been requisitioned during the second week.

As the weather grew colder, more and more people fell ill. The situation was aggravated by the poor sanitary conditions. There was almost no soap. New and troublesome insects began to appear, despite the weather. Before long we were fighting off rats too.

The advance of winter made it clear that we had all lost our resistance to physical stress.[27] With even the commonest antiseptics unobtainable a cut finger became a matter of grave concern. A bad cold was often a sentence of death. That's how I lost Johnny. I knew I shouldn't have allowed him to play outdoors the day we had that heavy snow; but there's a limit to how long you can keep a ten-year-old boy in a dark basement. The day they came to take Johnny's body away I thought it was the end of the road for me -- I could see the others going one by one -- but actually it was Helen who cracked up. Like a lot of other adults, she sank into an apathetic state and kept repeating that it was no use to go on. On the way to South Dakota she wandered off from the convoy and disappeared. She wasn't the only one.

Education Plans

When the news came that we were to be evacuated it was almost a relief. When our turn came, at the end of February, I packed what clothing I could, gave each of the bigger kids a bundle to carry, loaded Davey and some blankets into Johnny's old express wagon, and started off for the assembly center. We waited in the open most of a day before the trucks picked us up.

There were 160 of us that day, the tattered remnants of 82 families. We were twelve days on the road, sleeping at night on the floors of churches or schools or stores. The 1200 calories a day they allowed us was a poor defense against the cold, but providentially it turned warm the third day out. Around the ruins of Kansas City we could see fire-blackened fields being eroded by the melting snow.[9]

Life in camp is not so bad, if you can forget your hunger and don't think about the past or future. The important thing is that this is a low fallout area [17], so we are in much less danger than at home. Up here we are learning at first-hand that our basic needs really are food, clothing, and shelter -- they take up almost all our time. Whatever we have, we make ourselves, when we get some materials.

Those of us who are physically and mentally able to work have jobs of some sort. Caring for the sick is the commonest occupation. I teach in the improvised school. Sometimes we're so busy that we forget what has happened. But then there are the times when you wake up at night, and you can't help thinking. You wonder if there will ever be anything to life again beyond this struggle to exist. You try to recall what a piece of fresh meat looked like. You ask yourself what your children will do when they grow up -- or if they'll grow up -- or if they will ever have children of their own. You wonder if you've fought your way this far, only to be cut down by cancer. You ask if the landscape will ever be clothed in green fields and forests again. There's a biologist here who claims to know the answer to that one. He says the fields and forests will come back. Only it will take hundreds of years.[9]

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REFERENCES

The basic general source of information now available is the Summary-Analysis of Hearings, June 22-26, 1959, Biological & Environmental Effects of Nuclear War, Joint Congressional Committee on Atomic Energy, U.S. Government Printing Office, August, 1959. Copies can be obtained from the Joint Committee or through your own Congressman. The complete transcript of the Hearings will be available soon.

1. Summary-Analysis of Hearings, p. 4.
2. Summary-Analysis of Hearings, table V-2, p. 19. This table lists the numbers and types of bombs which the Congressional Committee assumed would strike various U.S. cities, including St. Louis, in the first day of a nuclear war.
3. Summary-Analysis of Hearings. p. 17, adjusted from 1950 census.
4. This is the point chosen as ground zero in St. Louis Civilian Defense exercises.
5. Summary Analysis of Hearings, table IV-1, p. 15. A 10 megaton bomb makes a crater 2500 feet in diameter and 240 feet deep and collapses even brick appartment houses out to a radius of seven miles. Big Bend is 6.8 miles from 11th and Pine.
6. "The Effects of Nuclear Weapons," U.S. Atomic Energy Commission, June 1957, pp. 305-308.
7. "The Effects of Nuclear Weapons," p. 299.
8. Summary Analysis of Hearings, p. 12. Fire storms were also discussed in more detail at the hearings by W. T. Ham, Jr., Ph. D.; George Mixter, Jr., M.D.; and C. H. Fugitt, Ph. D. See pp. 9-11 of their testimony.
9. From testimony on the ecological effects of a nuclear attack given at the hearings by Dr. J. N. Wolfe, Chief of the Environmental Sciences Board of the Division of Biology and Medicine of the AEC.
10. The hearings allotted one 8 and one 10 megaton weapon to St. Louis and specified that they be 50% fission and 50% fusion weapons. See p. 19, table V-2 of Summary Analysis.
11. Surface bursts are assumed to deposit 80% of their fallout in local fallout and only 20% in the stratosphere.
12. See Figure V-2 of Summary Analysis which gives size and shape of local fallout area.
13. Summary-Analysis of Hearings, p. 28.
14. Summary-Analysis of Hearings, p. 47.
15. Summary-Analysis of Hearings, p. 37.
16. Summary-Analysis of Hearings, p. 38.
17. Testimony and maps by Dr. L. Machta of the U.S. Weather Bureau. See Summary-Analysis figure V-1.
18. The fission debris has its intensity reduced by a very large quota in one year. It will be about 1/50,000 of the value it had 1 hour after the explosion but the longer lived isotopes, such as strontium 90 and cesium 137 (the half life of both is about 30 years) continue to give off radioactivity for many years.
19. Summary-Analysis of Hearings p. 22.
20. Summary-Analysis of Hearings p. 23.
21. Measurement taken in October 1958 in Columbia, Mo. Presented at May 5-8 Congressional Hearings on Nuclear Testing by Lyle T. Alexander of the U.S.D.A.
22. The half-life of strontium 90 is 30 years so in one hundred years the levels would have fallen to 1/8th their wartime values.
23. From Hearings, testimony on flash burns by Drs. Ham, Mixter and Fugitt.
24. From Hearings, testimony on blast effects by Dr. C. S. White.
25. Based on discussion of the 1942 Cocoanut Grove Disaster in Boston and Hiroshima experience by Drs. Ham, Mixter and Fugitt at Hearings.
26. Summary-Analysis of Hearings, p. 18.
27. Hearings, testimony on the acute effects of nuclear radiations by Dr. P. S. Harris.
28. From Hearings testimony of G. M. Dunning on Biological Effects of a Nuclear Attack.
29. The location of the county water plant is such as to permit the assumption that it might continue to function.
30. Hearings, testimony on food contamination Dr. E. P. Laug.